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NOVA SCOTIA SCHOOL SERIES.

THE

ARITHMETICAL TABLE BOOK,

FOR THE USE OF

SCHOOLS AND COUNTING HOUSES.

BY **W. R. MULHOLLAND,**
PRINCIPAL NORMAL SCHOOL, TRURO, N. S.

Prescribed for use in Public Schools of Nova Scotia, by the
Council of Public Instruction.

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The Arithmetical Table Book.

Notation and Numeration.

NOTATION is the writing or expressing of numbers by characters; and

NUMERATION is the reading of numbers expressed by characters

Two systems of Notation are in general use—the *Roman* and the *Arabic*.

THE ROMAN NOTATION

Employs seven capital letters to express numbers. Thus,

Letters—	I	V	X	L	C	D	M
	one	five	ten	fifty	hundred	five hundred	one thousand

Values— *One, five, ten, fifty, hundred, five hundred, one thousand.*
By combining these letters the ancient Romans formed the following

TABLE.

I.....	1	LX.....	60
II.....	2	LXX.....	70
III.....	3	LXXX.....	80
IV.....	4	XC.....	90
V.....	5	C.....	100
VI.....	6	CC.....	200
VII.....	7	CCC.....	300
VIII.....	8	CD.....	400
IX.....	9	D.....	500
X.....	10	DC.....	600
XI.....	11	DCC.....	700
XII.....	12	DCCC.....	800
XIII.....	13	CM.....	900
XIV.....	14	M.....	1000
XX.....	20	MM.....	2000
XXX.....	30	MMM.....	3000
XL.....	40	MMMD.....	3500
L.....	50	MDCOCXLX.....	1880

NOTE.—The system of Roman Notation is not well adapted to the purposes of numerical calculations, it is principally used for numbering chapters and sections of books, public documents, &c.

THE ARABIC NOTATION

Employs ten characters or figures to express numbers. Thus,

Figures—	1	2	3	4	5	6	7	8	9	0
----------	---	---	---	---	---	---	---	---	---	---

Names
and
Values.
one, two, three, four, five, six, seven, eight, nine, or
Values.
nought
cipher.

The first nine characters are called *significant figures*, because each has a value of its own. They are called *Digits*, a word derived from the Latin word *digitus*, which signifies *finger*.

The nought or cipher is also called *Nothing* or *zero*. The

cipher has of itself no value, but is used to indicate the order of the significant figures which precede it.

To facilitate the reading of whole numbers they are divided into periods of three figures each, beginning at units, according to the following

NUMERATION TABLE.

Thousands,	Hundreds of Thousands,	Tens of Millions,	Hundreds of Billions,	Tens of Billions,	Hundreds of Trillions,	Tens of Trillions,	Hundreds of Quadrillions,	Tens of Quadrillions,	Hundreds of Quadrillions,
4 3 2, 6 1 3, 8 2 5, 9 8 7, 6 5 4, 3 2 1	4 3 2, 6 1 3, 8 2 5, 9 8 7, 6 5 4, 3 2 1	4 3 2, 6 1 3, 8 2 5, 9 8 7, 6 5 4, 3 2 1	4 3 2, 6 1 3, 8 2 5, 9 8 7, 6 5 4, 3 2 1	4 3 2, 6 1 3, 8 2 5, 9 8 7, 6 5 4, 3 2 1	4 3 2, 6 1 3, 8 2 5, 9 8 7, 6 5 4, 3 2 1	4 3 2, 6 1 3, 8 2 5, 9 8 7, 6 5 4, 3 2 1	4 3 2, 6 1 3, 8 2 5, 9 8 7, 6 5 4, 3 2 1	4 3 2, 6 1 3, 8 2 5, 9 8 7, 6 5 4, 3 2 1	4 3 2, 6 1 3, 8 2 5, 9 8 7, 6 5 4, 3 2 1

NOTE.—This is called the French method of numeration, and is the one in general use. In the old form, which was called the English method, the periods contained six figures each.

Multiplication Table.

Twice	3 times	4 times	5 times	6 times	7 times
1 are 2	1 are 3	1 are 4	1 are 5	1 are 6	1 are 7
2 " 4	2 " 6	2 " 8	2 " 10	2 " 12	2 " 14
3 " 6	3 " 9	3 " 12	3 " 15	3 " 18	3 " 21
4 " 8	4 " 12	4 " 16	4 " 20	4 " 24	4 " 28
5 " 10	5 " 15	5 " 20	5 " 25	5 " 30	5 " 35
6 " 12	6 " 18	6 " 24	6 " 30	6 " 36	6 " 42
7 " 14	7 " 21	7 " 28	7 " 35	7 " 42	7 " 49
8 " 16	8 " 24	8 " 32	8 " 40	8 " 48	8 " 56
9 " 18	9 " 27	9 " 36	9 " 45	9 " 54	9 " 63
10 " 20	10 " 30	10 " 40	10 " 50	10 " 60	10 " 70
11 " 22	11 " 33	11 " 44	11 " 55	11 " 66	11 " 77
12 " 24	12 " 36	12 " 48	12 " 60	12 " 72	12 " 84
8 times	9 times	10 times	11 times	12 times	
1 are 8	1 are 9	1 are 10	1 are 11	1 are 12	
2 " 16	2 " 18	2 " 20	2 " 22	2 " 24	
3 " 24	3 " 27	3 " 30	3 " 33	3 " 36	
4 " 32	4 " 36	4 " 40	4 " 44	4 " 48	
5 " 40	5 " 45	5 " 50	5 " 55	5 " 60	
6 " 48	6 " 54	6 " 60	6 " 66	6 " 72	
7 " 56	7 " 63	7 " 70	7 " 77	7 " 84	
8 " 64	8 " 72	8 " 80	8 " 88	8 " 96	
9 " 72	9 " 81	9 " 90	9 " 99	9 " 108	
10 " 80	10 " 90	10 " 100	10 " 110	10 " 120	
11 " 88	11 " 99	11 " 110	11 " 121	11 " 132	
12 " 96	12 " 108	12 " 120	12 " 132	12 " 144	

Currencies.

MONEY is the commodity adopted to serve as a universal equivalent or measure of value of all other commodities, and for which individuals readily exchange their surplus products or their services.

COIN is metal struck, stamped or pressed with a die, to give it a legal, fixed value, for the purpose of circulating as money. The coins of civilized nations consist of *Gold, Silver, Copper, and Nickel*.

A MINT is a place in which the coin of a country or government is manufactured.

NOTE.—In all civilized countries mints and coinage are under the exclusive direction and control of government.

BULLION is uncoined gold or silver.

BANK BILLS OR BANK NOTES are bills or notes issued by a banking Company, and are payable to the bearer in gold or silver, at the bank, on demand. They are substitutes for coin.

TREASURY NOTES are notes issued by the General Government, and are payable to the bearer in gold or silver, at the general treasury, at a specified time.

Currency is coin, bank bills, treasury notes, and other substitutes for money, employed in trade and commerce.

A DECIMAL CURRENCY is a currency whose denominations increase and decrease according to the decimal scale.

CANADA MONEY.

10 Mills (*m*) make 1 Cent, marked *Ct.* or *C.*

100 Cents " 1 Dollar " *\$.*

NOTE.—Sterling Exchange at 9½ per cent. premium is equal to *par*; *e.g.*, £1 stg.=£4.86 2-3.

UNITED STATES MONEY.

10 Mills (*m*) make 1 Cent, marked *Ct.* or *C.*

10 Cents " 1 Dime, " *D.*

10 Dimes " 1 Dollar, " *\$.*

10 Dollars " 1 Eagle, " *E.*

NOTE 1.—Sterling Exchange at 9½ per cent. premium is equal to *par*; *e.g.*, £1 stg.=£4.86 2-3.

NOTE 2.—The currency of Cuba, Demerara, and the Windward Isles is Dollars and Cents: \$4.80=£1. stg.

*At a meeting of the leading merchants of Halifax, held July 20th, 1811 the value of the Spanish Dollar was fixed at 4s. Gd. stg., or 5s. currency; 18s. stg. were therefore equal to £1. currency. This premium of 1-9th being added to the sterling, constituted what is now called the *old par value* in the Dominion of Canada and the United States.

STERLING MONEY.

STERLING OR ENGLISH MONEY is the currency of Great Britain.

The unit is the pound sterling, and all the other denominations are divisors of this unit.

TABLE.

4 Farthings make 1 Penny, marked *d.*

2 Pence " 1 Shilling, " *s.*

20 Shillings " 1 Pound or Sovereign, " £ or Sov.

NOTE 1.—The currency of Bermuda, Jamaica, Antigua, Australia and New Zealand, is Sterling.

Weights.

WEIGHT is the measure of the quantity of matter a body contains, determined by the force of gravity.

NOTE.—The process by which the quantity of matter or the force of gravity is obtained is called *weighing*; and consists in comparing the thing to be weighed with some conventional standard.

The origin of all *weights* in England was derived from a *grain* of wheat. *Vide Statute of 51 Henry III*; 31 Edward I., and Henry VII., which enacted, that 32 of them gathered from the middle of the ear, and well dried, were to make 1 *pennyweight*; 20 *pennyweights* 1 *ounce*; and 12 *ounces* 1 *pound*.

It was subsequently thought better to divide the *pennyweight* into 24 equal parts, called *grains*.

The *Imperial Pound, Avoirdupois*, which is the standard unit by means of which all heavy goods or large masses is weighed, is defined to be the weight of *one-tenth* part of an *imperial gallon*, or of 27.7274 cubic inches of distilled water, ascertained at a time when the barometer stands at 30 ins., and the height of *Fahrenheit's* thermometer is 62°; and this standard may consequently be verified or recovered at any time, when it may be necessary to appeal to experiment.

If the weight of a cubic inch of distilled water be divided into 505 equal parts, and each of such parts be defined to be a *half-grain*, it follows that 27.7274 cubic inches contain very nearly 7000 such grains; and it is hence declared by Act of Parliament that 7000 *grains* exactly, shall hereafter be considered a *pound, avoirdupois*; and that 10 *grains* shall be equivalent to 1 *scruple*; and 3 *scruples* to 1 *dram*. But these latter denominations are seldom necessary, unless great nicety is required.

This weight receives its name from *avoirs*, the ancient name of *goods* and *chattels*, and *poids*, signifying *weight*, in the ordinary language of the country in the time of the *Normans*.

Three scales of weight are in general use in this country and in England; namely, *Troy*, *Avoirdupois*, and *Apothecaries*.

TROY WEIGHT.

TROY WEIGHT is used in weighing gold, silver, and jewels;

in philosophical experiments, and generally where great accuracy is required.

The unit is the pound, and of this all the other denominations in the table are divisors.

TABLE.

24 Grains	make 1 Pennyweight, 1 dwt.
20 Pennyweights	" 1 Ounce, 1 oz.
12 Ounces	" 1 Pound, 1 lb

NOTE 1.—It was called a *pennyweight* from its being the weight of the silver penny then in circulation.

The term ounce comes from the Latin word *uncia*, which signifies a twelfth part.

In the abbreviation, dwt., for pennyweight, d. is from the Latin word *denarius*, a penny; wt. the first and last letters of the English word weight. Oz. is from the Spanish word *onza*, an ounce.

NOTE 2.—Diamonds and other precious stones, are weighed by "Carats," each weighing $3\frac{1}{2}$ grains, or nearly $3\frac{1}{2}$ grains, Troy. The term carat, applied to gold has a relative meaning only: any quantity of pure gold, or of gold alloyed with any other metal, being supposed to be divided into 24 equal parts (carats). If the gold be pure, it is said to be 24 carats fine; if 22 parts be pure gold, and 2 parts alloy, it is said to be 22 carats fine.

NOTE 3.—Standard gold is 22 carats fine: jewellers' gold is 18 carats fine. Thus we generally perceive "18" on the cases of gold watches. This indicates that they are "18 carats fine," the lowest degree of purity which is marked; but many articles are manufactured as low as 9 carats fine.

AVOIRDUPOIS WEIGHT.

AVOIRDUPOIS WEIGHT is used for all ordinary purposes of weighing.

The unit is the pound, and the table is made up of its divisors and multiples.

TABLE.

		Grains, Troy.
16 Drams	make 1 Ounce,	1 oz. = 437.50
16 Ounces	" 1 Pound,	1 lb. = 7000
25 Pounds	" 1 Quarter,	1 qr. = 175000
4 Quarters	" 1 Hundredweight,	1 cwt = 700000
20 Hundredweight	" 1 Ton,	1 ton = 14000000

NOTE 1.—In the old system of weight 28 lbs. = 1 Quarter. The hundredweight was, consequently, 112 lbs., and the ton 2240 lbs.

2. The following denominations are also in use:—

196 lbs.	make 1 barrel of flour or corn meal.
200 "	1 " beef, pork or fish.
112 "	1 quintal of dried salt fish.
14 "	1 stone.
100 "	1 cask of raisins.
100 "	1 quintal dry fish in U. States.

APOTHECARIES' WEIGHT.

APOTHECARIES' WEIGHT is used by apothecaries and physicians in *compounding* medicines; but medicines are bought and sold by avoirdupois weight.

The unit is the pound, of which all the other denominations in the table are divisors.

TABLE.

20 Grains (gr)	make 1 Scruple, <i>se</i> or $\frac{1}{2}$
3 Scruples	" 1 Dram, <i>dr.</i> or $\frac{1}{3}$
8 Drams	" 1 Ounce, <i>oz.</i> or $\frac{1}{8}$
12 Ounces	" 1 Pound, <i>lb.</i> or <i>lb.</i>

Measures.

Measures (and weights) were invented 866 B. C.; fixed to a standard in England, A. D. 1257; regulated, 1492; equalized, 1826.

Agreeably to the Act of Uniformity which took effect 1st January 1826, the term measure may be divided into seven kinds, viz. — Length, Surface, Volume, Capacity, Specific Gravity, Space, Time and Motion.

The several denominations of these measures have reference to certain *Standards or Units of Measure*, which are entirely arbitrary, and consequently vary among different nations. In England and her Colonies the unit of

Length	is a <i>Yard</i>
Surface	is a <i>Square yard, foot or inch.</i>
Solidity	is a <i>Cubic yard.</i>
Capacity	is a <i>Gallon.</i>
Weight	is a <i>Pound.</i>

The *Standards of Angular Measure* and of *Time* are the same in all European and most other nations.

LINEAR OR LONG MEASURE.

Long Measure is used in measuring lines or distances.

TABLE.

12 Inches	make 1 Foot	marked <i>ft.</i>
3 Feet	" 1 Yard	" <i>yd.</i>
5½ Yards	" 1 Rod, Pole or Perch	" <i>rd. or p.</i>
40 Rods or Perches	" 1 Furlong	" <i>fur.</i>
8 Furlongs	" 1 Mile	" <i>m.</i>
3 Miles	" 1 League	" <i>lea.</i>
69½ Miles (nearly)	" 1 Degree	" <i>deg. or °</i>

NOTE 1.—In Ireland 7 Yards=1 Perch. An Irish mile is therefore longer than an English mile.

NOTE 2.—An inch is the smallest linear measure to which a name is given; but subdivisions are used for many purposes.—Among mechanics, the Inch is commonly divided into *eighths* and *sixteenths*. By the officers of the revenue, and by scientific persons, it is divided into *trinths*, *hundredths*, &c.—The inch, three-fourths inch, half-inch and quarter inch, divided into *twelfths*, are used by architects.

NOTE 3.—The following measurements may be added as useful in certain cases:—

4 Inches	make 1 Hand (used in measuring horses).
3 Inches	" 1 Palm.
18 Inches	" 1 Cubit.
3 Feet	" a Common Pace.
5 Feet	" a Roman Pace.
6 Feet	" a Fathom.
120 Fathoms	" a Cable's length.
60 Geographical Miles	make a degree.

SURVEYORS' LINEAR MEASURE.

A GUNTER'S CHAIN, used by land surveyors, is 4 rods or 66 feet long, and consists of 100 links.

The unit is the chain, and the table is made up of divisors and multiples of this unit.

TABLE.

7.92 inches (in)	make 1 link, marked <i>l.</i>
25 links	" 1 rod, " " <i>rd.</i>
4 rods, or 66 feet	" 1 chain, " " <i>ch.</i>
80 chains	" 1 mile, " " <i>mi.</i>

CLOTH MEASURE.

This measure, which is a species of Long Measure, is used for all kinds of cloth, muslin, ribbon, &c.

The yard in Cloth Measure, is the same as in Long Measure, but differs in its divisions and subdivisions.

2 <i>1</i> / <i>2</i> Inches	make 1 Nail.
4 Nails	" 1 Quarter, 1 qr.
4 Quarters	" 1 Yard, 1 yd.
5 Quarters	" 1 English Ell.
6 Quarters	" 1 French Ell.
3 Quarters	" 1 Flemish Ell.

Square Measure.

SQUARE MEASURE is used in computing areas or surfaces; as of land, painting, plastering, &c

The unit is the area of a square whose side is the unit of length. Thus, the unit of square feet is 1 foot square; of square yards, 1 yard square.

The table of square measure is formed from that of long measure, by multiplying each lineal dimension by itself.

TABLE.

144 Square Inches	make 1 Square Foot marked <i>sq. ft.</i>
9 Square Feet	" 1 Square Yard " <i>sq. yd.</i>
30 $\frac{1}{2}$ Square Yards	" 1 Square Pole " <i>sq. po.</i>
40 Square Poles	" 1 Square Rood " <i>ro.</i>
4 Rods	" 1 Acre " <i>ac.</i>
640 Acres	" 1 Square Mile " <i>sq. mi.</i>

NOTES 1.—Artificers estimate their work as follows:—

By the square foot: *glazing and stone cutting.*

By the square yard: *painting, plastering, paving, ceiling, and paper-hanging.*

By the square of 100 square feet: *flooring, roofing, slating, shingling and tiling.*

Brick-laying is estimated by the thousand bricks, by the square yard, and by the square of 100 square feet.

Mason work is estimated by the rood of 36 square yards.

2.—In estimating the painting of mouldings, cornices, &c., the measuring-line is carried into all mouldings and cornices.

3.—In estimating brick-laying by either the square yard or the square of 100 square feet, the work is understood to be 12 inches or 1 $\frac{1}{2}$ bricks thick. Mason work is allowed to be 22 inches thick.

4.—A thousand of shingles are estimated to cover 1 square, being laid 5 inches to the weather.

5.—Joiners, bricklayers, masons and plasterers, make an allowance for windows, doors, &c., of one half the openings or vacant spaces. Brick-layers and masons, in estimating their work by cubic measure, make no allowance for the corners of the walls of houses, cellars, &c., but estimate the work by the *girt*, that is, the entire length of the wall on the outside.

SURVEYORS' SQUARE MEASURE.

This measure is used by surveyors in computing the area or contents of land.

TABLE.

625 square links (sq. l.)	make 1 pole, <i>P</i>
16 poles	" 1 square chain, <i>sq. ch.</i>
10 square chains	" 1 acre, <i>ac.</i>
640 acres	" 1 square mile, <i>sq. mi.</i>

DUODECIMALS.

DUODECIMALS are the parts of a unit resulting from continually dividing by 12; as $\frac{1}{12}$, $\frac{1}{144}$, $\frac{1}{1728}$, etc. In practice, duodecimals are applied to the measurement of extension, the foot being taken as the unit.

In the duodecimal divisions of a foot the different orders of units are related as follows:

1' (inch or prime) is $\frac{1}{12}$ of a ft. or 1 in. linear measure.
 1" (second) or $\frac{1}{12}$ of $\frac{1}{12}$ is $\frac{1}{144}$ of a ft. or 1 in. square "
 1'"(third) or $\frac{1}{12}$ of $\frac{1}{12}$ of $\frac{1}{12}$ is $\frac{1}{1728}$ of a ft. or 1 in. cubic "

TABLE.

12 Fourths (""), make 1 third, 1"
12 Thirds " 1 second, 1"
12 Seconds " 1 prime, 1'
12 Primes " 1 foot, ft.

Cubic Measure.

A CUBE is a solid, or body, having six equal square sides. SOLIDITY is the matter or space contained within the boundary surfaces of a solid.

CUBIC MEASURE, also called Solid Measure, is used in computing the contents of solids, or bodies; as timber, wood, stone, &c.

The unit is the solidity of a cube whose side is the unit of length. Thus the unit of cubic feet is a cube which measures 1 foot on each side; the unit of cubic yards is 1 cubic yard, &c.

TABLE.

1728 Cubic Inches (cu. in.)	make 1 Cubic Foot	cu. ft.
27 Cubic Feet	" 1 Cubic Yard,	cu. yd.
40 Cubic Feet of round timber or	} 1 Ton or Load, t.	
50 Cubic Feet of hewn do., make		
16 Cubic Feet	" 1 Cord Foot,	cd. ft.
8 Cord Feet, or	} 1 Cord of Wood, cd.	
128 Cubic Feet		
5 Cubic Feet	" 1 Barrel Bulk.	
42 Cubic Feet of timber	" 1 Shipping Ton.	

NOTES.—1. A cubic yard of earth is called a load.

2. Railroad and transportation companies estimate light freight by the space it occupies, and heavy freight by weight.

3. In scaling or measuring timber for shipping or freighting, 1-5 of the solid contents of round timber is deducted for waste in hewing or sawing. Thus, a log that will make 40 feet of hewn or sawed timber, actually contains 50 cubic feet by measurement; but its market value is only equal to 40 cubic feet of hewn or sawed timber. Hence, the cubic contents of 40 feet of round and 50 feet of hewn timber, as estimated for market, are identical.

MEASURE OF CAPACITY.

CAPACITY signifies extent of room or space.

Measures of capacity are all cubic measures, solidity and capacity being referred to different units, as may be seen by comparing the tables.

Measures of capacity may be properly subdivided into two classes, Measures of Liquids and Measures of Dry Substances.

Liquid Measure.

OF THE DOMINION OF CANADA, P. E. ISLAND, NEWFOUNDLAND, UNITED STATES AND THE BRITISH WEST INDIA ISLANDS.

LIQUID MEASURE, also called Wine Measure, is used in measuring liquids; as molasses, water, liquors, &c.

The unit is the gallon, and the table is made up of its divisors and multiples.

TABLE.

		Cu. In.	Imp. Gall.
4 Gills (g)	make 1 Pint, marked <i>pt.</i>	28.875	= .10414
2 Pints	" 1 Quart "	57.75	= .20828
4 Quarts	" 1 Gallon "	231.	= .83311
31½ Gallons	" 1 Barrel.		
2 Barrels	" 1 Hogshead.		

NOTES.—1. To convert the above into imperial multiply by .83311.
To convert imperial into the above multiply by 1.20013.

2. The standard *unit of liquid measure* adopted by the above named places, is the old Wine Gallon of England, containing 231 cubic inches, or very nearly 8.338 lbs. avoirdupois of pure distilled water.

3. The denominations, barrel and hogshead, are used in estimating the capacity of cisterns, reservoirs, vats, &c.

4. The tierce, hogshead, pipe, butt, and tun, which we often find in invoices, are merely the names of casks, and do not express any fixed or definite measure. They are usually gauged, and have their capacities in gallons marked on them.

5. In the United states beer and milk is often measured by the old ale and beer measure, the gallon containing 282 cubic inches.

DRY MEASURE

OF THE DOMINION OF CANADA, P. E. ISLAND, NEWFOUNDLAND, UNITED STATES, AND THE BRITISH WEST INDIA ISLANDS.

DRY MEASURE is used in measuring articles not liquid; as grain, fruit, salt, roots, ashes, &c.

The unit is the bushel, of which all the other denominations in the table are divisors.

TABLE.

			Cub. In.	Imp. Gall.
4 Gills (g.)	make 1 Pint,	marked pt.	33.6	.12118
2 Pints	" 1 Quart,	" qu.	67.2	.24236
4 Quarts	" 1 Gallon,	" gall.	268.8	.96945
2 Gallons	" 1 Peck,	" pk.	537.6	1.93891
4 Pecks	" 1 Bushel,	" bush.	2150.4	7.75567
36 Bushels	" 1 Chaldron	" chal.		

NOTES.—1. To convert the above into Imperial multiply by .96945.
To convert Imperial into the above multiply by 1.03151.

2. The standard unit of dry measure adopted by the above named places is the *Winchester bushel*, so called because the standard measure was formerly kept at Winchester, England. This is an upright cylinder, which is 18½ inches in diameter and 8 inches deep, and contains 2150.42 cubic inches or 77.627 lbs. avoirdupois of distilled water, at 62° Fahr. and 30 inches barometer.

3. Grain and some other commodities are often sold by *stricken measure*, and in such cases the "measure is to be stricken with a round stick or roller, straight and of the same diameter from end to end."

4. When coal, fruit, roots, and a few other articles are sold by measure, the bushel and other measures are to be heaped. The bushel heaped measure is the Winchester bushel heaped in the form of a cone, which cone must be 19½ inches in diameter (= the outside diameter of the standard bushel measure,) and 6 inches high.

5. A bushel heaped measure contains 2747.7167 cubic inches or 597.2967 cubic inches more than a bushel stricken measure.

A bushel heaped measure contains 59.6917 cubic inches more than 5 pecks stricken measure. As this is about 1 bu. 1 pk. 1½ pts., it is sufficiently accurate in practice to call 5 pecks stricken measure 1 heap bushel.

6. As grain, potatoes, turnips, &c., are generally sold by standard bushel of a certain weight, the following table will be found useful:

	N. Scotia.	Canada.	P. E. I.	U. S.
A bushel of Oats,	38 lbs.	34 lbs.	36 lbs.	32 lbs.
" Wheat,	60 "	60 "	58 "	60 "
" Barley,	48 "	43 "	48 "	48 "
" Rye,	56 "	58 "	56 "	56 "
" Indian Corn,	58 "	56 "	57 "	56 "
" Beans,	58 "	50 "	60 "	56 "
" Peas,	58 "	60 "	60 "	66 "
" Buckwheat,	48 "	40 "		
" Potatoes and Turnips, 60 lbs., all other edible roots 40 lbs. per bushel.				

LIQUID AND DRY MEASURE OF ENGLAND, OR IMPERIAL MEASURE.

TABLE.

		Cubic Inches.
Gills	make 1 Pint, marked 1 pt.	34.6592
Pints	" 1 Quart, " 1 qt.	69.3185

				Cubic Inches.
4 Quarts make 1 Gallon,	marked 1 gal.	277.274		
2 Gallons "	1 Peck,	"	1 pk.	554.548
4 Pecks "	1 Bushel,	"	1 bus.	2218.192
8 Bushels "	1 Quarter,	"	1 quar.	17745.536
36 Bushels "	1 Chaldron,	"	1 ch.	

HEAPED MEASURE.

Potatoes, Turnips, Fruit, Lime, Coals, and a few other articles, are sometimes bought and sold by *heaped measure*.

TABLE.

		Cubic Inches.	
1 Peck,	=	703.87148	
4 Pecks	=	1 Bushel,	= 2815.4871
3 Bushels	=	1 Sack or Tub,	= 8446.45776
12 Tubs	=	1 Chaldron,	= 101357.49309.

NOTES.—1. The *standard unit* of both *liquid* and *dry measure* in Britain is the imperial gallon, and is defined to be a measure that will contain 277.274 cubic inches, the linear inch being that above mentioned, or 10 pounds avoirdupois of pure distilled water, weighed at a temperature of 32° Fahr. and under a barometric pressure of 30 inches.

2. The gallon and its multiples and parts are used to measure both *liquids*, as water, spirits, &c.; and *dry goods*, as *malt*, *corn*, &c., and the system is therefore called the *Imperial Liquid and Dry Measure*.

3. The bushel heap measure, is the Imperial bushel heaped in the form of a cone, which cone is to be 19½ inches in diameter and at least 6 inches high. The content of the heap is therefore 597.29518 cubic inches, which, added to 2218.192, the content of the bushel, gives 2815.4871 cubic inches for the content of the heaped bushel, and the contents of the other measures are in proportion.

COMPARATIVE TABLE OF MEASURES OF CAPACITY.

	Cub. in. in gall.	Cub. in. in qt.	Cub. in. in pt.	Cub. in. in gill.
Wine Measure,	231	57½	28½	7½
Dry Measure (½ pk.)	268½	67½	33½	8½
Imperial,	277½	69½	34½	8½

APOTHECARIES' FLUID MEASURE.

60 Minims (m.)	make 1 Fluidrachm, f. 3
8 Fluidrachms "	1 Fluidounce, f. 3
16 Fluidounces "	1 Pint, 0
9 Pints "	1 Gallon, Cong.

NOTE.—In some places a pint equals 20 ounces. A minim may be reckoned 2 drops, a drachm about a tea-spoonful, and 1 ounce about 2 table-spoonfuls.

Measure of Time.

TIME is the measure of duration. The unit is the day, and the table is made up of its divisors and multiples.

TABLE.

60 Seconds (sec)	make 1 Minute. 1 min.
60 Minutes	" 1 Hour, 1 hr.
24 Hours	" 1 Day, 1 day.
7 Days	" 1 Week, 1 wk.
28 Days	" 1 Lunar Month.
28, 29, 30, or 31 Days	" 1 Calendar Month.
12 Calendar Months	" 1 Year.
365 Days	" 1 Common year.
366 Days	" 1 Leap Year.
100 Years	" 1 Century.

NOTES.—1. In most business transactions 30 days are called a month.

2. The civil day begins and ends at 12 o'clock, midnight. The *astronomical day*, used by astronomers in dating events, begins and ends at 12 o'clock, noon. The civil year is composed of civil days.

3. The number of days in each month is easily remembered by means of the following lines:

Thirty days hath September,
April, June, and November;
All the rest have thirty-one:
Except leap-year, and then's the time,
February's days are twenty and nine.

4. The number of days in each month may also be recollected by counting the months on the *four* fingers and *three* intervening spaces. Thus, January on the first finger, February in space between first and second fingers; March on second finger; April in second space; May on third finger; June in third space; July on fourth finger; August on first finger (since there are no more spaces); September in first space, &c. Now, when counted thus, all months having 31 days come on the fingers, and all having 30 only fall into the spaces.

Measure of Angles.

CIRCULAR MEASURE, or Circular Motion, is used principally in surveying, navigation, astronomy, and geography, for reckoning latitude and longitude, determining locations of places and vessels, and computing difference of time.

The circumference of every circle is considered to be divided into 360 equal parts, each of which is often called a degree, as it subtends an angle of 1° at the centre of the circle.

The unit is the degree, which is $\frac{1}{360}$ part of the space about a point in any place. The table is made up of divisors and multiples of this unit.

TABLE.

1 Second is written 1 sec., or 1"

60 seconds make 1 Minute, 1 min. or 1'

60 Minutes " 1 Degree, 1 deg. or 1°

90 Degrees " 1 Right Angle, 1 rt. ang. or 90°

NOTE.—Minutes of the earth's circumference are called geographic or nautical miles.

French Weights and Measures.

The tables of Standard Weights and Measures adopted by the French Government, are all formed upon a decimal scale, and constitute what is called the *French Metrical System*.

FRENCH MONEY.

The *Franc* is the unit of money of the new system of French currency.

10 Centimes make 1 Decime.

10 Decimes " 1 Franc.

20 Francs " 1 Louis.

FRENCH LINEAL MEASURE.

The Standard unit of French lineal measure is the *Metre*. Its length according to the mean of several comparisons, is equal to 39.3809171 imperial inches.

10 Metres make 1 Decametre, = 32.817431 feet

10 Decametres " 1 Hectometre, = 328.17431 "

10 Hectometres " 1 Kilometre, = 3281.7431 "

10 Kilometres " 1 Myriametre, = 32817.431 "

The standard by which the new French measure of length is determined, is the quadrant of a meridian of the earth, or the terrestrial arc from the equator to the pole, in the Meridian of Paris. The ten-millionth part of this is called a *metre*, which is equal to 39.381 imperial inches nearly.

The *metre* is subdivided into 10 decimetres; the *decimetre* into 10 centimetres; the *centimetre* into 10 millimetres.

FRENCH SQUARE MEASURE.

The unit of French Superficial Measure is the *Arc*, whose sides are each a decametre in length. Consequently it contains 100 square metres, or 119.6648496 imperial square yards.

10 Arcs	make 1 Decare,	= 1196.648496 sq. yds.
10 Decares	" 1 Hectare,	= 11966.48496 "
10 Hectares	" 1 Kilare,	= 119664.8396 "
10 Kilares	" 1 Myaiare,	= 1196648.499 "

The *arc* is subdivided in the same manner as the *metre*.

FRENCH CUBIC MEASURE.

The *unit of French Cubic Measure* is the *Stere*, which is a cubic *metre*, and is equal to 61074.1564445 imperial cubic inches.

10 Decisteres	make 1 Stere,	35.24384 cubic feet.
10 Steres	" 1 Decastere,	353.4384 "

FRENCH LIQUID AND DRY MEASURE.

The *unit of French Liquid and Dry Measure* is the *Litre*, which is a cubic decimetre, and is equal to 61.074154445 imperial cubic inches, or .88106 imperial quarts.

10 Litres	make 1 Decalitre,	= 2.20266 gall.
10 Decalitres	" 1 Hectolitre,	= 22.0266 "
10 Hectolitres	" 1 Kilolitre,	= 220.262 "

The *litre* is subdivided in the same manner as the *stere*.

FRENCH CIRCULAR MEASURE.

The French divide the circle into 400 parts called *grades*, and the *quadrant* into 100 *grades*. The *grades* are divided into 100 equal parts, and each of these parts is divided into 100 other equal parts, according to the *centesimal* scale. Hence—

The Second	= .00009 English Degree.
The Minute	= .009 "
The Grade	= .9 "

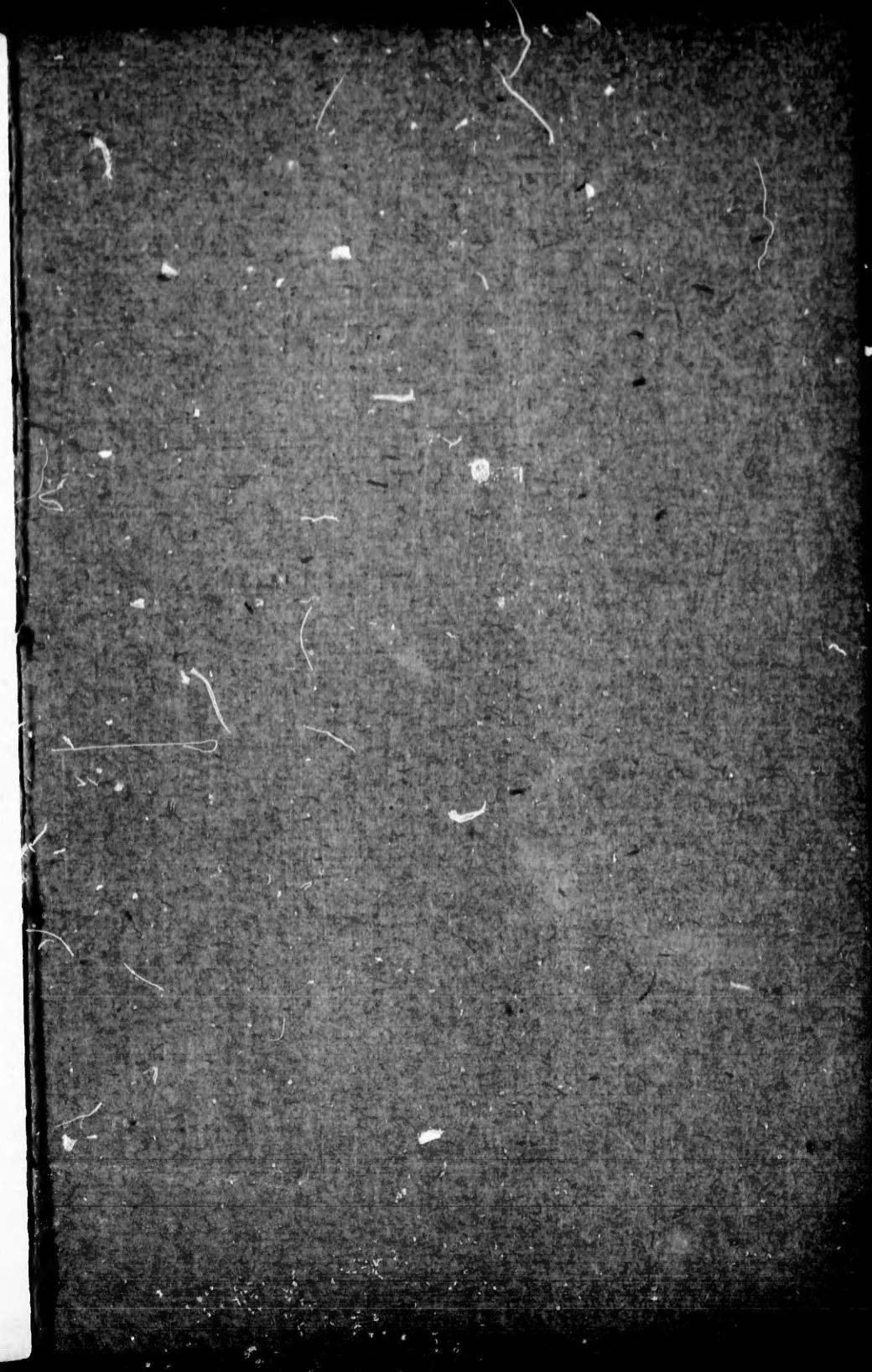
FRENCH WEIGHT.

The *unit of French Weights* is the weight of a cubic centimetre of distilled water, at the maximum density, and is called a *Gramme*. It is equal to 15.433159 Troy grains.

10 Grammes	make 1 Decagramme,	= 154331.59 grs
10 Decagrammes	" 1 Hectogramme,	= 1543.3159 "
10 Hectogrammes	" 1 Kilogramme,	= 15433.159 "
10 Kilogrammes	" 1 Myriagramme,	= 154331.59 "

The *gramme* is divided into 10 *decigrammes*; the *decigramme* into 10 *centigrammes*; the *centigramme* into 10 *miligrammes*.





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